

Enrollment No:- _____

Exam Seat No:- _____

C.U.SHAH UNIVERSITY

Summer-2015

Subject Code: 4SC02PHC1

Subject Name: Physics-II

Course Name: B.Sc. (Pure)

Date: 20/5/2015

Semester: II

Marks: 70

Time: 10:30 TO 01:30

Instructions:

- 1) Attempt all Questions in same answer book/Supplementary.
- 2) Use of Programmable calculator & any other electronic instrument prohibited.
- 3) Instructions written on main answer book are strictly to be obeyed.
- 4) Draw neat diagrams & figures (if necessary) at right places.
- 5) Assume suitable & perfect data if needed.

Q-1 Answer the each of the following questions in brief

- a) The dark current of a photodiode is 40 mA. Determine the dark resistance. Assume a reverse bias voltage of 15 V. (02)
- b) Define: Atomic number (Z) & Atomic mass (A) giving specific example.. (02)
- c) Calculate I_E in a transistor for which $\beta = 50$ and $I_B = 20$ mA. (02)
- d) Explain how and why does s capacitor block a DC signals? (02)
- e) Define Depletion Region. (02)
- f) Define: Isotopes and Isotones giving specific examples. (02)
- g) Differentiate: Crystalline Solids versus Non-Crystalline Solids (02)

Attempt any four from Q-2 to Q-8.

- Q-2
- a) Discuss the “Radioactive Disintegration Laws” and derive their formulas (06)
 - b) Compare the properties of α -particles, β -particles & γ – rays in tabulated form (06)
 - c) The Half Life Time of Radon is 3.8 days. Obtain its Decay Constant and Average Life Span. (02)

- Q-3
- d) Write about applications of X-rays. (05)
 - e) Mention the properties of X-rays (05)
 - f) An X-ray tube, operated at 30kV, emits continues X-ray spectrum with a short wavelength limit of 0.414 \AA . Calculate Plank’s constant h. (04)
Electron charge = $1.602 \times 10^{-19} \text{ coulomb}$; Light velocity = $3 \times 10^8 \text{ m/s}$

- Q-4
- a) Define diffraction? Write conditions for diffraction pattern. (04)

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20-5

- b) Explain difference between Fresnel and Fraunhofer diffraction. (04)
- c) State Fermat's principle. Deduce law of reflection and refraction using it. (06)
- Q-5 a) Tabulate the Seven Crystal Systems comprise of Fourteen Bravais Lattices giving their Lattice Parameters, crystal structure diagrams and specific examples of each. (05)
- b) Explain: "Lattice + Basis = Crystal Structure". (05)
- c) Describe Melde's Experiment. (04)
- Q-6 a) Explain Construction and working of a half wave rectifier. Deduce mathematical expression for I_{dc} and I_{rms} . (05)
- b) Explain C and C-L-C (p) filter circuits in detail. (05)
- c) In a double diode full wave rectifier, the internal resistance of each diode is 20Ω . The transformer R.M.S secondary voltage from centre tap to each end of secondary is 50 V and load resistance is 980Ω . Find (i) The mean load current. (ii) The R.M.S value of load current. (02)
- d) The four diodes used in a bridge rectifier circuit have a forward resistance of 1Ω and reverse resistance is infinite. The a.c. supply voltage is 240 V (r. m. s) and load resistance is 480Ω . Calculate the (i) Mean load current. (ii) Power dissipated in each diode. (02)
- Q-7 a) Explain Principle, Construction and Working of a Light Emitting Diode; mention its advantages and drawbacks. (06)
- b) Explain Working and Characteristics Photo-Diode. Write about any one application of Photo-Diode. (06)
- c) The photodiode is exposed to light with an illumination of 1.5 mW/cm^2 ; if the sensitivity of photodiode for the given condition is $57.6 \text{ mA/(mW/cm}^2)$. Find the reverse current through the device. (02)
- Q-8 a) What is a transistor? What is transistor action and its importance? Explain working of an NPN transistor. (07)
- b) Describe in detail Common Emitter (NPN) Transistor configuration with circuit diagram. Explain its input and output characteristics curves. (07)

